

Random Change

Random events play a significant role in evolution:

- 1) Genetic drift - random variations in which organisms manage to reproduce leading to changes over time in the genetic make-up of a population. Genetic drift depends upon a small population size as there is more of a chance for change to occur permanently. In larger populations there is more of a normalizing effect which counteracts genetic drift. Genetic drift can overshadow natural selection in small populations.
- 2) Gene Flow - any movement of genes from one population to another. If genes are carried to a population where they didn't previously exist then genetic variation in that population increases

Effects of Gene Flow on Evolution:

Within a Population: introduces or reintroduces genes to a population which increases genetic variation

Across populations: by moving genes around it can make distant populations genetically similar to one another which reduces the occurrence of speciation.

Question: Do you think sedentary organisms (those that don't move around on their own) have a higher or lower rate of gene flow?

- 3) Mutation - random changes in DNA code that affect large populations and therefore have the potential to realize benefits from new variations in genetic sequences.

- mutations may be neutral, deleterious, or beneficial

Video to explain this: <http://www.youtube.com/watch?v=RtIQvkQWTZY>

Types of Natural Selection

Refer to handout as well.

Environmental forces and sexual selection drive evolutionary changes by favouring certain individuals from among a group of individuals that exhibit a range of features. This occurs through several patterns:

Selection caused by environmental pressures

- 1) Stabilizing selection - the most common phenotypes are favoured by the environment. Evolved features are maintained.
- 2) Directional selection - extreme variations of a trait are favoured by the environment causing a shift in natural selection.
- 3) Disruptive selection - opposite extremes of a trait are favoured by the environment causing the selection of 2 or more variations of a trait that differs from the population average.

Sexual Selection

Sexual selection involves the selection of any trait that enhances mating success. This results in the contribution of traits to the gene pool for later generations.

Cumulative Selection

Cumulative selection attempts to explain how complex features might evolve from much simpler initial features.

Consider the examples presented in your textbook of the complex eye and insect-pollinated flowers which resulted from the combined effects of random mutation and selection acting over long periods of time.

- ☞ a beneficial mutation favours a single individual and its reproductive success increases
- ☞ additional mutations enhance or modify the same general feature which produces further beneficial refinements

Videos on the evolution of the eye:

http://www.youtube.com/watch?v=1TEKDW Ae_b8

<http://www.youtube.com/watch?v=1EKyqIJkuDQ>